The invention relates to compressed air-operated brake means, in particular for commercial vehicles, after the genus of the claim 1.

Axle load-dependent brake pressure regulators, with which the rear axle brake pressure of compressed air-operated commercial vehicles is more reducible in response of the loading, are since longer known. With air-fitted with springs vehicles the loading condition becomes for example direct from the bellows pressure of pneumatic spring bellows determined, or it becomes for example with vehicles, which have steel feathers/springs, over a linkage December distance between the vehicle axle and the vehicle frame detected and this signal the axle load-dependent brake pressure regulator supplied. Such a brake system known from the state of the art is exemplary in Fig. 1 shown. As from Fig. 1 comes out, covers compressed air-operated brake means four wheel brakes 10, 20, 30, 40, whereby two front axle brake cylinders 10, 20 at the front axle and two rear axle brake cylinders are 30, 40, at the rear axle arranged.

Both the front axle brake cylinder 10, 20 become through in each case them arranged at the front axle associated wheel lock control valves 11, 12 over an pedal-operated operating brake valve 14 and this downstream relay valve 15 operated, whereby by stepping a brake pedal 14a a circle of the zweikreisigen operating brake valve becomes 14 with a pressure supply V2 connected. The rear axle brake cylinders become against it only over a single wheel lock control valve 50 by stepping the brake pedal 14a operated. The wheel lock control valve 50 arranged at the rear axle becomes thereby over a achslastabhänqigen brake pressure regulator 70 with a pressure supply V1 connected. The axle load-dependent brake pressure regulator 70 thereby on the one hand the output signal becomes one of the two circles of the zweikreisigen operating brake cylinder 14 supplied over a pneumatic control line 17, on the other hand one it receives a signal over the loading condition of the vehicle, for example the bellows pressure with pneumatic spring vehicles or to the distance between axle and frame appropriate signal with steal-fitted with springs vehicles. The axle load-dependent brake pressure regulators 70 the braking force of the two rear axle brake cylinders 30, 40 regulates dependent from these signals over the wheel lock control valve 50, which is controllable over a signal line 52 by a controller.

Another brake means for commercial vehicles, known from the state of the art, are schematic in Fig. 2 shown. Here those elements are, those with those in Fig. 1 represented brake means identical are provided, with the same numerals, so that concerning their description on the embodiments to in Fig. 1 explained brake means respect taken become. Differently than with in Fig. 1 represented brake means are with in Fig. 2 represented brake means an actual known load empty valve 14b provided, which over a pneumatic line 71 the pressure supplied spent by the axle load-dependent brake pressure regulator becomes. The load empty valve 14b is in the operating brake valve 14, which becomes also as engine car brake valve referred, integrated. By this load empty valve 14b is the front axle brake pressure, D. h. the two front axle brake cylinders 10, 20 lying close the brake pressure, in response of the output pressure of the axle load-dependent brake

pressure regulator 70 on actual known manner influenceable.

Furthermore anti-skid systems for commercial vehicles are known, which are executed as 3-Kanal-Systeme with only a control valve for both rear wheels.

Finally it is known, the loading condition and the axle load distribution of the vehicle from the wheel number of revolutions signals, which become of wheel number of revolutions sensors actual known anti-skid systems detected to determine.

The invention is the basis the problem to train wheel brake mechanisms further of the above-described type in such a manner that of the loading condition and are possible of the axle load distribution dependent blockingprotected brakings of a vehicle without axle load-dependent brake pressure regulator.

This problem becomes according to invention by compressed air-operated brake means for commercial vehicles with the features of the claim 1 dissolved. By compensating the deviation of the target rear axle brake pressure and the Isthinterachs brake pressure by a relay valve the downstream rear axle wheel lock control valve, detected resultant with operating brake applications, of sensor means, can regarding the manufacturing costs, which escape manufacture quality and the service expenditure of problematic axle load-dependent brake pressure regulators. It becomes favourable-proves rather the anyway present rear axle wheel lock control valve used to the control of the brake pressure, which rests against the brake cylinder planned at the rear axle.

Favourable developments of the invention are subject matter of the Unteransprüche.

So for example provided is with a favourable embodiment that the actuating pressure resting to the control of the front axle brake pressure against a load empty valve of an operating brake valve is lock offable by a controllable solenoid valve with a regulatory contact of the wheel lock control control equipment, in order to make so a wheel lock control function possible.

This additional solenoid valve can be with a favourable embodiment part of the operating brake valve or engine car of brake valve.

With a simple, few parts comprising embodiment provided can be that the rear axle wheel lock control control valve is bottom elimination of the relay valve the direct operating brake valve downstream.

Other advantages and features of the invention are subject matter of the subsequent description as well as the graphic illustration of some embodiments of the invention.

In the drawing show:

Fig. 1 a first embodiment of compressed air-operated brake means known from the state of the art;

Fig. 2 an other embodiment of compressed air-operated brake means known from the state of the art;

Fig. 3 a first embodiment of compressed air-operated brake means according to invention;

Fig. 4 an other embodiment of compressed air-operated brake means according to invention and

Fig. 5 an other embodiment of compressed air-operated brake means making from the invention use.

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Compressed air-operated brake means for commercial vehicles, shown in Fig. , four wheel brake cylinders, two front wheel brake cylinders of 10, 20 and two rear wheel brake cylinders 30, 40 cover 3. The front wheel brake cylinders 10, 20 are subjectable over also an operating brake valve 14 referred as engine car brake valve and this downstream relay valve of 15 20 wheel lock control valves 11, 12 with a front axle brake pressure, associated over in each case the two wheel brake cylinders 10.

The two rear wheel brake cylinders 30, 40 are subjectable over a relay valve 72 and a rear axle wheel lock control valve 50 with a rear axle brake pressure.

As in Fig. 3 shown, is thereby a circle of the zweikreisigen operating brake valve 14 of the rear axle associated, whereas the other circle of the front axle is associated, so that a three-canal wheel lock control mechanism or a three-canal anti-skid device system is realized. The rear axle brake pressure resting against the rear axle becomes 80 detected by sensor means, whose electrical signal becomes 60 supplied over a broken represented electrical signal line 81 a controller. Furthermore the controller 60 a signal becomes over the loading condition of the vehicle supplied. It becomes a target rear axle brake pressure calculated. If the Isthinterachs brake pressure detected by the sensor 80 deviates from the calculated target rear axle brake pressure, the rear axle wheel lock control valve becomes 50 60 so driven over an electrical signal line 52 of the controller that this deviation disappears. In this way can in Fig. 1 and 2 more represented and initially explained axle load-dependent brake pressure regulator is void.

With another embodiment, shown in Fig. 4, is those elements, those with those in connection with Fig. 3 described embodiment identical are provided, with the same numerals, so that concerning their description on the embodiments to the above, in connection with Fig. 3 described embodiment full respect taken becomes contentwise.

Contrary to in Fig. 3 represented embodiment points in Fig. 4 represented embodiment an actual known load empty valve 14b up, which becomes the rear axle brake pressure over a pneumatic control line 73 supplied. By the load empty valve 14b, which is in the operating valve 14 integrated, the front axle brake pressure in response of the rear axle brake pressure can become on actual known manner affected. With a regulatory contact of the controller 60 for preventing blocking the wheels now a solenoid valve arranged in the pneumatic line 73 becomes 90 so driven that it locks the line off 73, so that against the load empty valve 14b no actuating pressure rests and the front axle brake cylinders 10, 20 and the rear axle brake cylinders 30, 40 separate from each other more controllable are.

The solenoid valve 90 can be both in the operating brake valve or engine car brake valve 14 and into the rear axle wheel lock control valve 50 integrated (not shown).

With in Fig. 5 represented embodiment is those elements, those with those in connection with Fig. 3 and Fig. 4 of described embodiment identical is provided, with the same numerals, so that concerning their description on the embodiments to represented the above in connection with Fig. 3 and Fig. 4 represented embodiments full contentwise respect taken becomes.

Contrary to in Fig. 3 represented embodiment is void with in Fig. 5 represented embodiment that the operating brake valve 14 downstream relay valve 72, so that rear axle brake pressure direct against the wheel lock control control valve 50 the lying close pressing of the operating brake valve 14 by means of the brake pedal 14a rests, which dependent of the pressure detected by the sensor is controllable by the controller 60.